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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,914	10/28/2003	Takaharu Kondo	03500.017666.	3968
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EXAMINER				
BARTON, JEFFREY THOMAS				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/693,914

**Applicant(s)**

KONDO ET AL.

**Examiner**

Jeffrey T. Barton

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 10-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SG/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12 August 2008 has been entered.

### ***Response to Amendment***

2. The request for reconsideration filed on 12 August 2008 does not place the application in condition for allowance.

### ***Status of Rejections Pending Since the Office Action of 12 February 2008***

3. The rejection of claims 1-9 under 35 U.S.C. §103(a) as unpatentable over Arao et al is maintained.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arao et al. (US 6,238,808)

With respect to claim 1, Arao et al disclose a zinc oxide film formed on a substrate, having a plurality of texture constituents comprised of a plurality of hills each having first and second surfaces bordering each other along a curved line, as claimed. (Figures 5-10) Arao et al disclose that the c-axis of the ZnO grains can be at angles of 15° up to 40° from the substrate normal (Column 17, lines 63-66; Claim 1; Examples up

to 24°), which corresponds to an angle of 50-75 ° relative to the plane of the substrate. This overlaps the range of 30-60° for the angle of inclination of the first surface. Arao et al also disclose that the c-axis of the grains is normal to the facets of the grains in the ZnO films. (Column 5, lines 35-36) With the facets thus disposed at 90° from the first surface, it follows that these facets will be at angles 50-75 ° from the substrate normal, or 15-40 ° from the plane of the substrate, which likewise overlaps the claimed range for angle of inclination of the second surface.

Arao et al do not explicitly disclose the c-axis of the grains of their films being at an angle of 30-35° from normal to the substrate.

However, because Arao et al teach c-axis angles of over 15° from the substrate normal (Claim 1) and further teach that c-axis angles of up to 40° from normal are obtained (Column 17, lines 63-66), it is clearly within the scope of the disclosure, and would have been obvious to one having ordinary skill in the art to prepare ZnO films having c-axis angles of 30-35° from substrate normal, or 55-60° from the plane of the substrate. Since the facets of the grains are normal to the c-axis (Column 5, lines 35-36), the second surface will be at an angle of 30-35° from the plane of the substrate, thus meeting the limitations of the claim.

With respect to claim 2, Arao et al disclose a curved first surface (i.e. the surface parallel to the c-axis) and a planar second surface. (Figures 5-10; Column 5, lines 31-43)

With respect to claim 3, Arao et al disclose the c-axis being normal to the facets of the crystal grains. (Column 5, lines 35-36) This facet corresponds to the (0002) plane of zinc oxide.

With respect to claim 4, as the majority of the crystals grown under given conditions will be at similar angles, in a sample having c-axes disposed at an average angle of inclination of 55-60° with the second surface at 30-35°, this limitation is met.

With respect to claim 5, the projected areas of the lower-angle surfaces will clearly be greater than those of the higher-angle surfaces.

With respect to claim 6, the maximum dimension of the grains shown, e.g. in Figures 7A and 7B of Arao et al is on the order of 1-2 micrometers, and is clearly over 800 nm and less than 10 micrometers for over 80% of the hills. In addition, grain sizes of up to 1.2 micrometers are disclosed as preferred. (Column 19, lines 1-16)

With respect to claims 7 and 8, no particular weight can be given to limitations directed solely to the way in which the product is made, except insofar as it defines structure. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) However, Arao et al do disclose depositing the zinc oxide film by electrodeposition from an aqueous solution

onto a substrate having a sputtered zinc oxide film, precisely as claimed. (Column 6, lines 41-64)

With respect to claim 9, Arao et al disclose a photovoltaic device having a semiconductor film superposed on the zinc oxide films. (Abstract)

In addition, it appears the methods used to make the films of Arao et al are substantially the same as those disclosed in the instant application as suitable for making the claimed zinc oxide films. Compare column 6, lines 41-64 and column 5, lines 23-30 of Arao et al with page 53, line 3 – page 56, line 22 of the instant specification. The resulting films likewise have the same or similar appearance when imaged by SEM. (Compare Figures 5-10 of Arao et al with instant Figures 8 and 9) Accordingly, in the absence of evidence to the contrary, the films produced by these methods must be considered to be at least similar enough to render the instant films unpatentable, as the only differences would appear to be matters of optimization, within the level of ordinary skill in the art. Note MPEP 2144.05.

### ***Response to Arguments***

8. Applicant's arguments filed 12 May 2008 have been fully considered but they are not persuasive.

Applicant argues that the cited portion of Arao et al (Column 17, lines 63-66) simply teaches that when the thickness of the crystal is over 1 micrometer, the inclination by AFM becomes greater than 20°, and sometimes reaches 40°, and that the cited portion does not teach the limitations to the surfaces bordering each other along a

curved line, or the angles of the surfaces being as claimed. Applicant's arguments are not persuasive because the inclination of the crystal grains taught in the cited portions (i.e. Column 17, lines 63-66 and Column 5, lines 35-36) correspond to the angles recited in the instant claims, as pointed out in detail in the final rejection. Arai et al teaches that the facets of the grains are normal to the c-axis (Column 5, lines 35-36), and the grain angles in such a film clearly define the surface angles produced by the protruding grains. Furthermore, the figures of Arai showing SEM images of the films (e.g. Figures 5-10) clearly show the first and second surfaces bordering each other along a curved line as claimed. Therefore, Applicant's arguments are not persuasive.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrey T. Barton/  
Art Unit 1795  
23 January 2009